REMARKS

This is in response to the Office Action dated May 18, 2010. In view of the following representations, the Examiner is respectfully requested to reconsider the rejections of claims 3-6.

Claim Rejections - 35 U.S.C. § 102(b)

On pages 3-5 of the Office Action, claims 3-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Fuller (U.S. Patent No. 2,615,199). This rejection is respectfully traversed.

The present invention, as defined in independent claim 3, is directed to a screw-type kneading/extruding machine including an intermediate portion formed of an agitating portion 6, a kneading/transporting portion 7, and a plurality of screw pieces 10 having a surface renewing ability. As shown in Fig. 1, the screw pieces 10 are located at a position corresponding to a vent opening 4, and each of the screw pieces is formed of any one of a feed type kneading screw piece, a twist kneading screw piece, a rotary screw piece and a cut-flight screw piece.

Fuller (U.S. 2,615,199) discloses a material treating apparatus including feed worms 22, 23 disposed in a double barrel structure 16, 17. The feed worms include (from an upstream section) forward flight screw sections 29, 30; reverse flight screw sections 31, 32; forward feed flights 46, 47; and main discharge flights 48, 49. As shown in Fig. 1, a release chamber 44 is formed in the barrel structure.

In the rejection of claim 3, the Examiner takes the position that:

(A) The wider pitch forward flight sections 29 and 30 correspond to the agitating section.

(B) The densely pitched sections 22 and 23 (downstream portions of flights 29, 30) correspond to the kneading/transporting portion.

(C) The screw pieces 31, 32, 46 and 47 correspond to the screw pieces having a surface renewing ability.

However, it is submitted that one of ordinary skill in the relevant art would recognize that the sections of the Fuller apparatus do not correspond to the claimed portions of the present invention as defined in claim 3. In particular, the wider pitch forward flight sections 29, 31 are screw pieces of a normal type, the function thereof being transportation rather than agitation. Further, each of the wider pitch forward flight sections 29 and 31 is a single flight having a transporting capability; however, the agitating function of these flights is very low.

Further, each of the densely pitched sections 22 and 23 is a single flight screw piece of full flight and short pitch. The densely pitched sections 22 and 23 have a smaller pitch than the wider pitch flight sections 29 and 30. Thus, the capacity to hold the resin material becomes smaller, and the ability to transport the resin material becomes lower.

Accordingly, the wider pitch flight sections 29 and 30 have a high transporting ability, and the densely pitched sections 22 and 23 have a low transporting ability. Therefore, the resin material may be suspended in the densely pitched sections 22 and 23, and the agitating ability becomes higher than in the wider pitch flight sections 29 and 31. In other words, the agitating ability of the densely pitched sections 22 and 23 is "higher" than in the wider pitch flight sections 29 and 31. Therefore, the Examiner's characterizations of the wider pitch flight sections 29, 31 and the densely pitched sections 22, 23 are incorrect. It is submitted that the functions of the flights in the Fuller apparatus would be apparent to those of ordinary skill in the art, i.e. engineers of screw-type kneading/extruding machines.

Further, as indicated above, screw pieces 31, 32 are a "Back Full flight" type which is a reverse feeding screw. Therefore, the screw pieces 31, 32 employed in Fuller are clearly different from the feeding screw system of the present invention.

Further, a mechanical engineer, especially an engineer of screw type kneading/extruding machines, would readily understand that the Fuller screw pieces 31, 32 do not correspond to the plurality of screw pieces that are capable of renewing a surface of a raw material, wherein each of the screw pieces is formed of any one of a feed type kneading screw piece, a twist kneading screw piece, a rotary screw piece and a cut-flight screw piece.

Further, in the Fuller apparatus (col. 2, lines 14-26), the reverse flight screw sections 31, 32 exert a retarding action on the forward movement of the resin material, and, as a result, the material is thoroughly agitated in the high pressure section created by the screw sections 31, 32. Therefore, pressure from the resin material that passes through the screw pieces 31, 32 is suddenly released, and a devolatilization phenomenon is suddenly caused; and thereby the possibility of entrainment or vent-up of resin material is increased.

With respect to the screw pieces 46, 47 of Fuller, the screw pieces 46, 47 are a wide flight type, and clearly do not correspond to the kneading screw piece, the twist kneading screw piece, the rotary screw piece and the cut-flight screw piece of claim 3. The construction and function of screw pieces 46 and 47 would be apparent to those of ordinary skill in the art.

Further, as shown in Figs. 1-2 of Fuller, screw pieces 46 and 47 are a wide width type, and thereby the groove formed by this type of screw piece becomes narrower, and the transporting ability of the resin material becomes remarkably lower. As a result, the resin material, which is not transported, is caused to flow over upper portions of the screw pieces 46 and 47. Therefore, the surface renewing capability of the screw pieces 46 and 47 is non-existent. Accordingly, the surface renewing ability of screw pieces 46 and 47 is lower than that of the screw pieces required in claim 3 of the present invention.

Further, as described in the Fuller reference, the wider pitch flight sections 29, 31 and the densely pitched sections 22, 23 constitute a transporting portion; the screw pieces 31, 32 constitute an agitating portion; and the screw pieces 46, 47 constitute a kneading/transporting portion. However, the Fuller apparatus is similar to and more closely corresponds to the prior art apparatus shown in Fig. 3 of the present invention.

According to the present invention, resin material is melted or heated by the agitating portion 6, the melted resin material is then kneaded and transported by the kneading/transporting portion 7 to vent opening 4 in a low pressure condition, and thereby devolatilization is slowly executed. The remaining volatile components are expelled by the screw pieces 10 having a surface renewing ability at the vent opening 4. As a result, it is possible to protect against entrainment and vent-up by using the machine defined in claim 3 and shown in Fig. 1 of the present invention.

In view of the above, the Examiner is respectfully requested to withdraw the rejection of claims 3-6 and pass this case to issue. In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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